On-Farm Understandings: Assessing the Impact of Seeding Rates on Wheat and Sunflower Grain Yield through On-Farm Trials



Ashley Ammeter¹, Madison Kostal¹, Morgan Cott¹, Andrew Hector¹

¹Manitoba Crop Alliance



Background

- · There have been genetic improvements to wheat varieties and sunflower hybrids over the last decade.
- Seeding rates were evaluated for both spring wheat and sunflowers to understanding the agronomic and economical impact of increased and decreased seeding rate compared to the farmers normal.
- MCA's Research on the Farm program conducts scientific research with farmer members - on their own fields and with their own equipment using a replicated strip trial design.

Material and Methods

- Seeding rate differences were selected by the farmer.
- Each trial site had three or four replicates with each replicate including all treatments (Figure 1).
- Management practices (ex. Nitrogen rate, tillage, seed treatment) were consistent across treatments and selected by farmers.
- Each strip was a minimum of 1000 ft in length. Each strip was at least one combine header in width (Figure 1).

Sunflower:

Wheat:

- 26 sites from 2020-2023.
- Seeded variety was selected by the farmer. Varieties were mostly in the CWRS class.
- Seeding rates ranged from 60-180 lbs/ac. Rates were +/- 18-45 lbs/ac from the farmers normal.
- Yield and plant density measured. • Plant stands evaluated at 1-3 leaf stage.



- Yield and plant density measured.
- Plant stands evaluated at V2 stage.



Figure 1. Example of randomized trial layout, with two treatments and a check. Each treatment is replicated four times

Results and Discussion

Wheat: 13 of 26 (50%) wheat sites had significantly different plant stand densities between seeding rate treatments. The highest seeding rate treatment had the highest plant stand density at all sites where a significant difference was observed.

Sunflower: 14 of 21 (67%) sunflower sites had significant plant density differences. The highest planting rate treatments had the highest plant stand density at 12 sites where a significant difference was observed.



10,000 12,000 14,000 16,000 18,000 20,000 22,000 24,000 26,000 28,000 5 10 15 20 25 30 35 40 45 50 55 Plant Stand Density (pl/ac) Plant Stand Density (pl/ft²)

Figure 2. Summary of wheat (top) and sunflower (middle) yields across all trial sites. Letters denote significant differences at P<0.05. Summary of wheat (bottom left) and sunflower (bottom right) yield by plant stand density. Blue shaded area signifies the optimum target plant population for each crop (Sunflower: 18 000 - 20 000 pl/ac (non-oil), 22 000 - 24 000 pl/ac (oil), Wheat: 23 -28 pl/ft²).

- Wheat: 3 of 26 (11.5 %) sites had significant yield differences between seeding rate treatments. Increasing the seeding rate in drought year (2021 and 2023) did not significantly increase grain yield. In these trials, there was a loss of profit of \$5-12/ac, when using the higher seeding rate, from increased seed cost, as there were no significant yield differences. Manitoba farmers have a good idea of the optimum seeding rate on their farms and seeding rate did not significantly influence the yield in these trials. This trial did not evaluate factors such as seeding rate effects on weed suppression or stand uniformity.
- Sunflower: 6 of 21 (29%) sites had significant yield differences between planting rate treatments. The highest planting rate was significantly higher yielding at 1 of 6 sites. In 2021 and 2023 the lower and normal planting rate treatments were most profitable, based on seed cost, at 73% of the sites. In 2022, which was wetter than "normal", the higher seeding rate was most profitable at 60% of sites. Manitoba farmer achieved appropriate plant populations for both oil and confection sunflowers.

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- selected by the farmer.
- Planting rates ranged from 13 000-29 500 pl/ac. Rates were +/- 3000 pl/ac from the farmers normal.

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